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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/785,666	02/23/2004	Raymond Lee Lavoie JR.	03012US	2681

7590 02/25/2005  
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EXAMINER

MULLER, BRYAN R

ART UNIT	PAPER NUMBER
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3723

DATE MAILED: 02/25/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No.	Applicant(s)	
	10/785,666	LAVOIE ET AL.	
	Examiner	Art Unit	
	Bryan R Muller	3723	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
  - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
  - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
  - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 23 February 2004.
- 2a) ☐ This action is FINAL.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☒ Claim(s) 1 and 7 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)               | Paper No(s)/Mail Date. _____  |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

### ***Claim Objections***

1. Claim 1 is objected to because of the following informalities: The phrase, "ratio of thermoplastic polymer" in lines 4 and 5 should be "ratio of *the* thermoplastic polymer". Appropriate correction is required.
2. Claim 7 is objected to because of the following informalities: The phrase, "ratio of thermoplastic polymer" in line 11 should be "ratio of *the* thermoplastic polymer". Appropriate correction is required

### ***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:  

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
4. Claim 1 recites the limitation "the non-ferrous interconnect" in lines 5 and 6.  
There is insufficient antecedent basis for this limitation in the claim.
5. Claim 7 recites the limitation "the non-ferrous interconnect" in line 12. There is insufficient antecedent basis for this limitation in the claim.

### ***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claim 1-10 rejected under 35 U.S.C. 103(a) as being unpatentable over Tsuchiya et al (Pub. No. 2002/0035872) in view of Choi et al (Pub. No. 2003/0139127).

8. In reference to claim 1, Tsuchiya discloses a chemical mechanical polishing (CMP) slurry (CMP process commonly used for polishing semiconductor substrates) that comprises a thickener in an amount of 0.001-0.05 wt% that may be any of a group of polymers including Polyvinylpyrrolidone (PVP) or (thermoplastic) polyvinyl alcohol (PVA). Choi discloses a capsulated abrasive composition (a slurry for use in CMP polishing) that comprises a binder (similar to a thickener) that is preferably PVA (paragraphs 22 and 32), silica as an abrasive, and also provides PVP in an amount of 1-10 wt% to improve the cohesiveness of the abrasives (paragraph 36), which is desirable to keep the abrasives closely grouped and adherent to the substrate to be polished to provide a consistent uniform polish. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the Tsuchiya slurry with 0.001-0.05 wt% PVA as a thickener and 1-10 wt% PVP to further improve cohesiveness of the abrasives, as taught by Choi. It further would have been obvious that varying the weight ratio of the PVA and PVP would control the removal rate of the semiconductor substrate because any change in the weight ratio of the two elements would alter the thickness of the slurry and the cohesiveness of the abrasives, which would inherently have an effect on the removal rate. The ranges provided are competent rejections based on MPEP § 2131.03 [R-2] - PRIOR ART WHICH TEACHES

A RANGE WITHIN, OVERLAPPING, OR TOUCHING THE CLAIMED RANGE ANTICIPATES IF THE PRIOR ART RANGE DISCLOSES THE CLAIMED RANGE WITH "SUFFICIENT SPECIFICITY".

9. In reference to claim 2, the thermoplastic in the slurry of Tsuchiya is PVA.

10. In reference to claim 3, Tsuchiya discloses that the slurry comprises a polishing material, which may be silica (paragraph 27) in an amount of 0.1-50 wt% and more preferably 1-10 wt% (paragraph 29).

11. In reference to claim 4, Tsuchiya discloses that the molecular weight of the thickener (PVA) is in the range of 10,000-5,000,000 and more preferably 50,000-2,000,000, which would produce a range of weight average molecular weight that would overlap the claimed range of 1,000-1,000,000 grams pre mole. It would have been obvious that the degree of hydrolyzation of the PVA would be at least 20 mole percent because the PVA will be within a fluid mixture comprising a large majority of water (paragraph 26) based on the composition percentages provided for other contents of the slurry.

12. In reference to claim 5, it would be obvious that the PVP should have a similar molecular weight as the PVA to prevent dishing or erosion and provide an adequate polishing rate as taught by Tsuchiya (paragraph 43).

13. In reference to claim 6, the percentage ranges of PVP and PVA that will be present in the slurry provide a possible ratio range of 10,000:1 (10%:0.001%) to 20:1 (1%:0.05%), which overlaps the claimed range (see MPEP § 2131.03 [R-2]).

14. In reference to claim 7, Tsuchiya discloses a polishing composition comprising 0.001-.05 wt% PVA (within claimed range), 0.0001-5 wt% (within claimed range) benzotriazole as an (corrosion inhibitor) antioxidant (paragraphs 50 and 51), 0.01-5 wt% (within claimed range) citric acid as a (complexing agent) oxidation aid (paragraphs 44-48), 0.01-15% (overlapping claimed range) hydrogen peroxide as an oxidizer (paragraphs 30 and 31), and 0.1-50 wt% and more preferably 1-10 wt% silica abrasive, as discussed supra, with a pH in the range of 3-9 or more preferably 4-8 (overlapping claimed range, paragraph 52). As discussed supra, it would have been obvious to include PVP in a range of 1-10% (overlapping range) and it would have been obvious that varying the weight ratios of the PVP and PVA will control the removal rate. It will further be obvious that the ranges discloses for the molecular weights of the PVP and PVA will provide ranges of weight average molecular weights that would overlap or touch the claimed ranges.

15. In reference to claim 8, in view of the obvious alteration to the slurry of Tsuchiya in view of the teachings of Choi, as discussed supra, it would be obvious to use the modified slurry in the method disclosed by Tsuchiya, which provides the steps of applying a polishing composition (modified) to a semiconductor substrate and polishing the semiconductor substrate at a given pad pressure and it again would have been obvious that varying the weight ratios of the PVP and PVA would control the removal rate.. Tsuchiya discloses an example wherein the pad pressure is 27.6 kPa but it would have been obvious to one of ordinary skill in the art at the time the invention was made to vary the polishing pad pressure in order to achieve a desired removal rate.

16. In reference to claim 9, it would have been obvious that the variation of the weight ratio of PVP and PVA, pad pressure, polishing speed, and slurry supply rate would be able to provide a removal rate within the range of 150 Angstroms/min or less.

17. In reference to claim 10, Tsuchiya discloses a removal rate of 400-1,500 nm/min, which is equivalent to 4,000-15,000 Angstroms/min, which falls within the claimed range of 150 Angstroms/min or more. It further would have been obvious that the variation of the weight ratio of PVP and PVA, pad pressure, polishing speed, and slurry supply rate would be able to provide a removal rate within the range of 150 Angstroms/min or more.

### ***Conclusion***

18. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Kurata (2003/0219982) discloses a CMP slurry with PVP or PVA and teaches a range of weight average molecular weight similar to the claimed ranges and Sachan (6,616,717 and 6,699,299), Wake (6,436,811 and 2002/0037642), Thomas (2002/0019202), Ishibashi (2003/0121214), Dauguet (4,222,747), Sasaki (5,352,277), Costas (6,443,812) and Tsuchiya (6,530,968 and 2001/0005009) all disclose polishing compositions with either PVA, PVP or both and possess other similarities to the claimed composition.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bryan R Muller whose telephone number is (571) 272-4489. The examiner can normally be reached on M-Th and every other Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph J Hail III can be reached on (571) 272-4485. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

BRM *BRM*  
2/17/2005



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